

# SEQUENCE LISTING

<110> Johal, Gurmukh S  
Multani, Dilbag S

<120> SORGHUM DWARFING GENES AND METHODS OF USE

<130> 5718-100 (035718/205458)

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<150> 60/165,176

<151> 1999-11-12

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<170> PatentIn Ver. 2.1

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Glu Leu Lys His Val Asp Phe Ser Tyr Pro Ser Arg Pro Asp Ile Gln	
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Ala Phe Asn Ala Glu Arg Lys Ile Thr Gly Leu Phe Glu Ala Asn Leu  
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Arg Gly Pro Leu Arg Arg Cys Phe Trp Lys Gly Gln Ile Ala Gly Ser  
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Gly Tyr Gly Val Ala Gln Phe Leu Leu Tyr Ala Ser Tyr Ala Leu Gly  
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Leu Trp Tyr Ala Ala Trp Leu Val Lys His Gly Val Ser Asp Phe Ser  
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Arg Thr Ile Arg Val Phe Met Val Leu Met Val Ser Ala Asn Gly Ala  
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primer designed from sequence of Zea mays Br2 gene

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 Gly Ala Pro His Ala Asp Asp Asp Ala Gly Asp Glu Trp Ala Arg Pro  
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gag ctc gag gcc ttc cac ctc ccc tct ccc gcc cac cag cct cct ggc 144  
 Glu Leu Glu Ala Phe His Leu Pro Ser Pro Ala His Gln Pro Pro Gly  
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ttc cac cta gcc gct ggg cac caa ccg gaa gct gca gca gag caa ccc 192  
 Phe His Leu Ala Ala Gly His Gln Pro Glu Ala Ala Ala Glu Gln Pro  
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acc acg ctc cct gct gcc cgc cgc acc agc gac aca tcc act gct gct 240  
 Thr Thr Leu Pro Ala Ala Arg Arg Thr Ser Asp Thr Ser Thr Ala Ala  
 65 70 75 80

ggt gct gct cct cct tct cct tcg ccg cct ccg ccg ccg gct cct ttg 288  
 Gly Ala Ala Pro Pro Ser Pro Ser Pro Pro Pro Pro Pro Ala Pro Leu  
 85 90 95

gag atg gac cag ccg ccc aat gcc aag ccg gcc tcc tcc tcc gcc gcc 336  
 Glu Met Asp Gln Pro Pro Asn Ala Lys Pro Ala Ser Ser Ser Ala Ala



290

295

300

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 Gly Ala Gln Arg Arg Arg Ala Arg Gln Ala Leu Leu Gln Glu Pro Gly  
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cgc gct gtc ggg cgc cag cgg cat cgc gga gca ggc gct cgc gca gat 1008  
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 325 330 335

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 Thr Asp Arg Ala Gly Leu Arg Arg Arg Gly Ala Arg Asn Ala Gly Val  
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 Arg Gln Gly Ala Arg Pro Arg Arg His Leu Leu His Arg Leu Leu Leu  
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 Thr Asn Gly Gly Leu Ala Ile Ala Thr Met Phe Ser Val Met Ile Gly  
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 Gly Leu Ala Leu Gly Gln Ser Ala Pro Ser Met Ala Ala Phe Ala Lys  
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 Gly Ile Ser Ser Arg Asp Gly Glu Asp Gly Gly Gly Val Glu Leu Glu  
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 Ser Val Thr Gly Arg Val Glu Met Arg Gly Val Asp Phe Ala Tyr Pro  
 465 470 475 480

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485

490

495

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 Ala Gly Lys Thr Ile Ala Leu Val Gly Ser Ser Gly Ser Gly Lys Ser  
 500 505 510

acg gtg gtg tcg ctc ctc gag agg ttc tac gac ccc agc gca ggg caa 1584  
 Thr Val Val Ser Leu Leu Glu Arg Phe Tyr Asp Pro Ser Ala Gly Gln  
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 Ile Leu Leu Asp Gly His Asp Leu Lys Ser Leu Lys Leu Arg Trp Leu  
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 Met Leu Lys Asn Pro Ala Ile Leu Leu Leu Asp Glu Ala Thr Ser Ala  
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 Leu Asp Ser Glu Ser Glu Lys Leu Val Gln Glu Ala Leu Asp Arg Phe  
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 Met Ile Gly Arg Thr Thr Leu Val Ile Ala His Arg Met Ser Thr Ile  
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cgc aag gcc gac gtg gtg gcc gtg ctg cag ggc ggc ccc gtc tcc gag 2064  
 Arg Lys Ala Asp Val Val Ala Val Leu Gln Gly Gly Pro Val Ser Glu

675	680	685	
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Met Gly Ala His Asp Glu Leu Met Ala Lys Gly Glu Asn Gly Thr Tyr			
690	695	700	
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Ala Lys Phe Ile Arg Met Gln Glu Gln Ala His Glu Ala Ala Phe Val			
705	710	715	720
aac gcc cgc cgc agc agc gcc agg ccc tcc agc gcc cgc aac tcc gtc			2208
Asn Ala Arg Arg Ser Ser Ala Arg Pro Ser Ser Ala Arg Asn Ser Val			
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agc tcg ccc atc atg acg cgc aac tcc tcc tac ggc cgc tcc cca tac			2256
Ser Ser Pro Ile Met Thr Arg Asn Ser Ser Tyr Gly Arg Ser Pro Tyr			
740	745	750	
tcc cgc cgc ctc tcc gac ttc tcc acc tcc gac ttc acc ctc tcc atc			2304
Ser Arg Arg Leu Ser Asp Phe Ser Thr Ser Asp Phe Thr Leu Ser Ile			
755	760	765	
cac gac ccg cac cac cac cac cgg acg atg gcc gac aag cag ctc gcg			2352
His Asp Pro His His His His Arg Thr Met Ala Asp Lys Gln Leu Ala			
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Phe Arg Ala Gly Ala Ser Ser Phe Leu Arg Leu Ala Arg Met Asn Ser			
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ccc gag tgg gcc tac gcg ctc gtc ggc tcc ctg ggc tcc atg gtc tgc			2448
Pro Glu Trp Ala Tyr Ala Leu Val Gly Ser Leu Gly Ser Met Val Cys			
805	810	815	
ggc tcc ttc agc gcc atc ttc gcc tac atc ctc agc gcc gtg ctc agc			2496
Gly Ser Phe Ser Ala Ile Phe Ala Tyr Ile Leu Ser Ala Val Leu Ser			
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gtc tac tac gcg ccg gac cct cgc tac atg aag cgc gag atc gcc aag			2544
Val Tyr Tyr Ala Pro Asp Pro Arg Tyr Met Lys Arg Glu Ile Ala Lys			
835	840	845	
tac tgc tac ctg ctc atc ggc atg tcc tcc gcg gcg ctg ctg ttc aac			2592
Tyr Cys Tyr Leu Leu Ile Gly Met Ser Ser Ala Ala Leu Leu Phe Asn			
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acg gtg cag cac gtg ttc tgg gac acg gtc ggc gag aac ctc acg aag			2640
Thr Val Gln His Val Phe Trp Asp Thr Val Gly Glu Asn Leu Thr Lys			

865	870	875	880	
cgt gtg cgc gag aag atg ttc gcc gcc gtg ctc cgc aac gag atc gcc				2688
Arg Val Arg Glu Lys Met Phe Ala Ala Val Leu Arg Asn Glu Ile Ala				
	885	890	895	
tgg ttc gac gcc gac gag aac gcc agc gcg cgc gtc gcc gcc agg ctc				2736
Trp Phe Asp Ala Asp Glu Asn Ala Ser Ala Arg Val Ala Ala Arg Leu				
	900	905	910	
gcg ctc gac gcc cag aac gtg cgc tcc gcc atc ggg gac cgt atc tcc				2784
Ala Leu Asp Ala Gln Asn Val Arg Ser Ala Ile Gly Asp Arg Ile Ser				
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gtc atc gtc cag aac tcg gcg ctc atg ctc gtc gcc tgc acc gcg ggc				2832
Val Ile Val Gln Asn Ser Ala Leu Met Leu Val Ala Cys Thr Ala Gly				
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ttc gtc ctc cag tgg cgc ctc gcg ctc gtg ctc ctc gcc gtc ttc ccg				2880
Phe Val Leu Gln Trp Arg Leu Ala Leu Val Leu Leu Ala Val Phe Pro				
	945	950	955	960
ctc gtc gtg gcc gcc acc gtg ctg cag aag atg ttc atg aag ggc ttc				2928
Leu Val Val Ala Ala Thr Val Leu Gln Lys Met Phe Met Lys Gly Phe				
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tcg ggg gac ctg gag gcc gcg cac gcc agg gcc acg cag atc gcg ggc				2976
Ser Gly Asp Leu Glu Ala Ala His Ala Arg Ala Thr Gln Ile Ala Gly				
	980	985	990	
gag gcc gtg gcc aac ctg cgc acc gtg gcc gcg ttc aac gcg gag cgc				3024
Glu Ala Val Ala Asn Leu Arg Thr Val Ala Ala Phe Asn Ala Glu Arg				
	995	1000	1005	
aag atc acg ggg ctg ttc gag gcc aac ctg cgc ggc ccg ctc cgg cgc				3072
Lys Ile Thr Gly Leu Phe Glu Ala Asn Leu Arg Gly Pro Leu Arg Arg				
	1010	1015	1020	
tgc ttc tgg aag ggg cag atc gcc ggc agc ggc tac ggc gtg gcg cag				3120
Cys Phe Trp Lys Gly Gln Ile Ala Gly Ser Gly Tyr Gly Val Ala Gln				
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ttc ctg ctg tac gcg tcc tac gcg ctg ggg ctg tgg tac gcg gcg tgg				3168
Phe Leu Leu Tyr Ala Ser Tyr Ala Leu Gly Leu Trp Tyr Ala Ala Trp				
	1045	1050	1055	
ctg gtg aag cac ggc gtg tcc gac ttc tcg cgc acc atc cgc gtg ttc				3216
Leu Val Lys His Gly Val Ser Asp Phe Ser Arg Thr Ile Arg Val Phe				

1060	1065	1070	
atg gtg ctg atg gtg tcc gcc aac ggc gcc gcc gag acg ctg acg ctg			3264
Met Val Leu Met Val Ser Ala Asn Gly Ala Ala Glu Thr Leu Thr Leu			
1075	1080	1085	
gcg ccg gac ttt gtc aag ggc ggg cgc gcg atg cgg tcc gtg ttc gag			3312
Ala Pro Asp Phe Val Lys Gly Gly Arg Ala Met Arg Ser Val Phe Glu			
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acc atc gac cgg aaa acg gag gtg gag ccc gac gac gtg gac gcg gcg			3360
Thr Ile Asp Arg Lys Thr Glu Val Glu Pro Asp Asp Val Asp Ala Ala			
1105	1110	1115	1120
ccg gtg ccg gag cgg ccc aag ggc gag gtg gag ctg aag cac gtg gac			3408
Pro Val Pro Glu Arg Pro Lys Gly Glu Val Glu Leu Lys His Val Asp			
1125	1130	1135	
ttc tcg tac ccg tcg cgg ccg gac atc cag gtg ttc cgc gac ctg agc			3456
Phe Ser Tyr Pro Ser Arg Pro Asp Ile Gln Val Phe Arg Asp Leu Ser			
1140	1145	1150	
ctc cgg gcg cgc gcc ggg aag acg ctg gcg ctg gtg ggt ccg agc ggg			3504
Leu Arg Ala Arg Ala Gly Lys Thr Leu Ala Leu Val Gly Pro Ser Gly			
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tgc ggc aag agc tcg gtg ctg gcg ctg gtg cag cgg ttc tac gag ccc			3552
Cys Gly Lys Ser Ser Val Leu Ala Leu Val Gln Arg Phe Tyr Glu Pro			
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acg tcc ggg cgc gtg ctc ctg gac ggc aag gac gtg cgc aag tac aac			3600
Thr Ser Gly Arg Val Leu Leu Asp Gly Lys Asp Val Arg Lys Tyr Asn			
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ctg cgg gcg ctg cgg cgc gtg gtg gcg gtg gcg ccg cag gag ccg ttc			3648
Leu Arg Ala Leu Arg Arg Val Val Ala Val Ala Pro Gln Glu Pro Phe			
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ctg ttc gcg gcg agc atc cac gac aac atc gcg tac ggg cgc gag ggc			3696
Leu Phe Ala Ala Ser Ile His Asp Asn Ile Ala Tyr Gly Arg Glu Gly			
1220	1225	1230	
gcg acg gag gcg gag gtg gtg gag gcg gcg acg cag gcg aac gcg cac			3744
Ala Thr Glu Ala Glu Val Val Glu Ala Ala Thr Gln Ala Asn Ala His			
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cgg ttc atc gcg gcg ctg ccg gag ggc tac ggg acg cag gtg ggc gag			3792
Arg Phe Ile Ala Ala Leu Pro Glu Gly Tyr Gly Thr Gln Val Gly Glu			



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Arg Gly Val Gln Leu Ser Gly Gly Gln Arg Gln Arg Ile Ala Ile Ala			
1265	1270	1275	1280
cgc gcg ctg gtg aag cag gcg gcc atc gtg ctg ctg gac gag gcg acc			3888
Arg Ala Leu Val Lys Gln Ala Ala Ile Val Leu Leu Asp Glu Ala Thr			
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agc gcg ctg gac gcc gag tcg gag cgg tgc gtg cag gag gcg ctg gag			3936
Ser Ala Leu Asp Ala Glu Ser Glu Arg Cys Val Gln Glu Ala Leu Glu			
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cgc gcg ggg tcc ggg cgc acc acc atc gtg gtg gcg cac cgg ctg gcc			3984
Arg Ala Gly Ser Gly Arg Thr Thr Ile Val Val Ala His Arg Leu Ala			
1315	1320	1325	
acg gtg cgc ggc gcg cac acc atc gcg gtc atc gac gac gcc aag gtg			4032
Thr Val Arg Gly Ala His Thr Ile Ala Val Ile Asp Asp Gly Lys Val			
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gcg gag cag ggg tcg cac tcg cac ctg ctc aag cac cat ccc gac ggg			4080
Ala Glu Gln Gly Ser His Ser His Leu Leu Lys His His Pro Asp Gly			
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Cys Tyr Ala Arg Met Leu Gln Leu Gln Arg Leu Thr Gly Gly Cys Arg			
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Ala Arg Ala Ala Ala Val Val Val Gln Arg Gly Arg Arg Val Gly Trp			
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1395	1400		

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<212> PRT

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<400> 9

Met Ser Thr Asn Asp Pro Asp Glu Ile Arg Ala Arg Val Val Val Leu

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15



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Ala Gly Ala Arg His Ala Arg Arg Arg Ala Ala His Arg Arg His Arg  
 290 295 300

Gly Ala Gln Arg Arg Arg Ala Arg Gln Ala Leu Leu Gln Glu Pro Gly  
 305 310 315 320

Arg Ala Val Gly Arg Gln Arg His Arg Gly Ala Gly Ala Arg Ala Asp  
 325 330 335

Thr Asp Arg Ala Gly Leu Arg Arg Arg Gly Ala Arg Asn Ala Gly Val  
 340 345 350

Leu Gly Gly Val Gly Arg Arg Ala Glu Asp Arg Leu Pro Gln Arg Leu  
 355 360 365

Arg Gln Gly Ala Arg Pro Arg Arg His Leu Leu His Arg Leu Leu Leu  
 370 375 380

Leu Arg Pro Pro Ala Leu Val Arg Arg Thr Pro Arg Pro Arg Asn His  
 385 390 395 400

Thr Asn Gly Gly Leu Ala Ile Ala Thr Met Phe Ser Val Met Ile Gly  
 405 410 415

Gly Leu Ala Leu Gly Gln Ser Ala Pro Ser Met Ala Ala Phe Ala Lys  
 420 425 430

Ala Arg Val Ala Ala Ala Lys Ile Phe Arg Ile Ile Asp His Arg Pro  
 435 440 445

Gly Ile Ser Ser Arg Asp Gly Glu Asp Gly Gly Gly Val Glu Leu Glu  
 450 455 460

Ser Val Thr Gly Arg Val Glu Met Arg Gly Val Asp Phe Ala Tyr Pro  
 465 470 475 480

Ser Arg Pro Asp Val Pro Ile Leu Arg Gly Phe Ser Leu Ser Val Pro  
 485 490 495

Ala Gly Lys Thr Ile Ala Leu Val Gly Ser Ser Gly Ser Gly Lys Ser  
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Thr Val Val Ser Leu Leu Glu Arg Phe Tyr Asp Pro Ser Ala Gly Gln  
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Ile Leu Leu Asp Gly His Asp Leu Lys Ser Leu Lys Leu Arg Trp Leu  
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Arg Gln Gln Ile Gly Leu Val Ser Gln Glu Pro Thr Leu Phe Ala Thr  
545 550 555 560

Ser Ile Lys Glu Asn Leu Leu Leu Gly Arg Asp Ser Gln Ser Ala Thr  
565 570 575

Gln Ala Glu Met Glu Glu Ala Ala Arg Val Ala Asn Ala His Ser Phe  
580 585 590

Ile Val Lys Leu Pro Asp Gly Tyr Asp Thr Gln Val Gly Glu Arg Gly  
595 600 605

Leu Gln Leu Ser Gly Gly Gln Lys Gln Arg Ile Ala Ile Ala Arg Ala  
610 615 620

Met Leu Lys Asn Pro Ala Ile Leu Leu Leu Asp Glu Ala Thr Ser Ala  
625 630 635 640

Leu Asp Ser Glu Ser Glu Lys Leu Val Gln Glu Ala Leu Asp Arg Phe  
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Met Ile Gly Arg Thr Thr Leu Val Ile Ala His Arg Met Ser Thr Ile  
660 665 670

Arg Lys Ala Asp Val Val Ala Val Leu Gln Gly Gly Pro Val Ser Glu  
675 680 685

Met Gly Ala His Asp Glu Leu Met Ala Lys Gly Glu Asn Gly Thr Tyr  
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Ala Lys Phe Ile Arg Met Gln Glu Gln Ala His Glu Ala Ala Phe Val  
705 710 715 720

Asn Ala Arg Arg Ser Ser Ala Arg Pro Ser Ser Ala Arg Asn Ser Val  
725 730 735

Ser Ser Pro Ile Met Thr Arg Asn Ser Ser Tyr Gly Arg Ser Pro Tyr  
740 745 750

Ser Arg Arg Leu Ser Asp Phe Ser Thr Ser Asp Phe Thr Leu Ser Ile  
755 760 765

His Asp Pro His His His His Arg Thr Met Ala Asp Lys Gln Leu Ala  
770 775 780

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Phe	Arg	Ala	Gly	Ala	Ser	Ser	Phe	Leu	Arg	Leu	Ala	Arg	Met	Asn	Ser	
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Pro	Glu	Trp	Ala	Tyr	Ala	Leu	Val	Gly	Ser	Leu	Gly	Ser	Met	Val	Cys	
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Gly	Ser	Phe	Ser	Ala	Ile	Phe	Ala	Tyr	Ile	Leu	Ser	Ala	Val	Leu	Ser	
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Val	Tyr	Tyr	Ala	Pro	Asp	Pro	Arg	Tyr	Met	Lys	Arg	Glu	Ile	Ala	Lys	
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Tyr	Cys	Tyr	Leu	Leu	Ile	Gly	Met	Ser	Ser	Ala	Ala	Leu	Leu	Phe	Asn	
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Thr	Val	Gln	His	Val	Phe	Trp	Asp	Thr	Val	Gly	Glu	Asn	Leu	Thr	Lys	
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Arg	Val	Arg	Glu	Lys	Met	Phe	Ala	Ala	Val	Leu	Arg	Asn	Glu	Ile	Ala	
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Trp	Phe	Asp	Ala	Asp	Glu	Asn	Ala	Ser	Ala	Arg	Val	Ala	Ala	Arg	Leu	
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Ala	Leu	Asp	Ala	Gln	Asn	Val	Arg	Ser	Ala	Ile	Gly	Asp	Arg	Ile	Ser	
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Val	Ile	Val	Gln	Asn	Ser	Ala	Leu	Met	Leu	Val	Ala	Cys	Thr	Ala	Gly	
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Phe	Val	Leu	Gln	Trp	Arg	Leu	Ala	Leu	Val	Leu	Leu	Ala	Val	Phe	Pro	
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Leu	Val	Val	Ala	Ala	Thr	Val	Leu	Gln	Lys	Met	Phe	Met	Lys	Gly	Phe	
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Ser	Gly	Asp	Leu	Glu	Ala	Ala	His	Ala	Arg	Ala	Thr	Gln	Ile	Ala	Gly	
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Glu	Ala	Val	Ala	Asn	Leu	Arg	Thr	Val	Ala	Ala	Phe	Asn	Ala	Glu	Arg	
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Lys	Ile	Thr	Gly	Leu	Phe	Glu	Ala	Asn	Leu	Arg	Gly	Pro	Leu	Arg	Arg	
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Cys	Phe	Trp	Lys	Gly	Gln	Ile	Ala	Gly	Ser	Gly	Tyr	Gly	Val	Ala	Gln	
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Phe Leu Leu Tyr Ala Ser Tyr Ala Leu Gly Leu Trp Tyr Ala Ala Trp  
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Leu Val Lys His Gly Val Ser Asp Phe Ser Arg Thr Ile Arg Val Phe  
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Met Val Leu Met Val Ser Ala Asn Gly Ala Ala Glu Thr Leu Thr Leu  
 1075 1080 1085

Ala Pro Asp Phe Val Lys Gly Gly Arg Ala Met Arg Ser Val Phe Glu  
 1090 1095 1100

Thr Ile Asp Arg Lys Thr Glu Val Glu Pro Asp Asp Val Asp Ala Ala  
 1105 1110 1115 1120

Pro Val Pro Glu Arg Pro Lys Gly Glu Val Glu Leu Lys His Val Asp  
 1125 1130 1135

Phe Ser Tyr Pro Ser Arg Pro Asp Ile Gln Val Phe Arg Asp Leu Ser  
 1140 1145 1150

Leu Arg Ala Arg Ala Gly Lys Thr Leu Ala Leu Val Gly Pro Ser Gly  
 1155 1160 1165

Cys Gly Lys Ser Ser Val Leu Ala Leu Val Gln Arg Phe Tyr Glu Pro  
 1170 1175 1180

Thr Ser Gly Arg Val Leu Leu Asp Gly Lys Asp Val Arg Lys Tyr Asn  
 1185 1190 1195 1200

Leu Arg Ala Leu Arg Arg Val Val Ala Val Ala Pro Gln Glu Pro Phe  
 1205 1210 1215

Leu Phe Ala Ala Ser Ile His Asp Asn Ile Ala Tyr Gly Arg Glu Gly  
 1220 1225 1230

Ala Thr Glu Ala Glu Val Val Glu Ala Ala Thr Gln Ala Asn Ala His  
 1235 1240 1245

Arg Phe Ile Ala Ala Leu Pro Glu Gly Tyr Gly Thr Gln Val Gly Glu  
 1250 1255 1260

Arg Gly Val Gln Leu Ser Gly Gly Gln Arg Gln Arg Ile Ala Ile Ala  
 1265 1270 1275 1280

Arg Ala Leu Val Lys Gln Ala Ala Ile Val Leu Leu Asp Glu Ala Thr  
 1285 1290 1295

Ser Ala Leu Asp Ala Glu Ser Glu Arg Cys Val Gln Glu Ala Leu Glu  
 1300 1305 1310

Arg Ala Gly Ser Gly Arg Thr Thr Ile Val Val Ala His Arg Leu Ala  
 1315 1320 1325

Thr Val Arg Gly Ala His Thr Ile Ala Val Ile Asp Asp Gly Lys Val  
 1330 1335 1340

Ala Glu Gln Gly Ser His Ser His Leu Leu Lys His His Pro Asp Gly  
 1345 1350 1355 1360

Cys Tyr Ala Arg Met Leu Gln Leu Gln Arg Leu Thr Gly Gly Cys Arg  
 1365 1370 1375

Ala Arg Ala Ala Ala Val Val Val Gln Arg Gly Arg Arg Val Gly Trp  
 1380 1385 1390

Met Asp Gly Ser Trp Met Ser Leu Val Pro  
 1395 1400

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